CLAIMS

What is claimed is:

1. An RF power-amplifier bias-management system comprising:

a controller configured to select a radio operating mode;

a current-mirror circuit coupled to said controller and configured to produce a reference control current as a function of said radio operating mode;

a bias regulator coupled to said controller, coupled to said current-mirror circuit, and configured to respond to said reference current; and

a power-amplifier output stage coupled to said bias regulator and having a bias current determined by said bias regulator.

2. A system as claimed in claim 1 additionally comprising a power-amplifier driver stage coupled to said bias regulator and having a bias current determined by said bias regulator.

3. A system as claimed in claim 2 additionally comprising a DC-to-DC converter coupled to said controller and configured to provide a supply voltage for said output stage and said driver stage in response to said radio operating mode.

4. A system as claimed in claim 1 additionally comprising a DC-to-DC converter coupled to said controller and configured to provide a supply voltage for said output stage in response to said radio operating mode.

5. A system as claimed in claim 1 wherein:

said bias regulator comprises a reference transistor;

said output stage comprises an output transistor; and

said reference transistor and said output transistor are formed upon a common substrate.

6. A system as claimed in claim 5 wherein:

said reference transistor is thermally coupled to said output transistor through said common substrate; and

said bias regulator is configured so that changes in conductivity of said output transistor due to thermal variations are compensated for by proportionate changes in conductivity in said reference transistor.

7. A system as claimed in claim 1 wherein:

said system additionally comprises an envelope detector coupled to said current-mirror circuit and configured to produce an input-signal envelope current in response to an RF input signal; and

said current-mirror circuit is configured to produce said reference current as a function of said radio operating mode and said input-signal envelope current.

8. A bias-management system for a transmitter power amplifier, said system comprising:

a current-mirror circuit configured to produce a quiescent reference current in response to a digital control signal;

a bias regulator coupled to said current-mirror circuit and configured to respond to said quiescent reference current; and

an output stage coupled to said bias regulator and having a quiescent bias current in response to said bias regulator.

9. A system as claimed in claim 8 additionally comprising a driver stage coupled to said bias regulator and having a quiescent bias current in response to said bias regulator.

10. A system as claimed in claim 8 wherein:

said bias regulator comprises a reference transistor;

said output stage comprises an output transistor;

said reference transistor is thermally coupled to said output transistor through a common substrate; and

said bias regulator is configured so that changes in conductivity of said output transistor due to thermal variations in said common substrate are compensated for by proportionate changes in conductivity in said reference transistor.

11. A system as claimed in claim 8 wherein:

said system additionally comprises an envelope detector configured to produce an envelope current in response to an RF input signal;

said current-mirror circuit is configured to produce said quiescent reference current in response to said digital control signal, and is further configured to dynamically alter said quiescent reference current into a dynamic reference current in response to said envelope current;

said bias regulator is configured to respond to said dynamic reference current; and

said output stage has a dynamic bias current in response to said bias regulator.

12. A bias-management system for a transmitter power amplifier, said system comprising:

a driver stage having a driver-stage bias current with quiescent and dynamic components;

an output stage coupled to said driver stage and having an output-stage bias current with quiescent and dynamic components;

a bias regulator coupled to said driver and output stages and configured to provide said driver-stage and output-stage bias currents; and

a current-mirror circuit coupled to said bias regulator and configured to establish said quiescent components of said driver-stage and output-stage bias currents.

13. A system as claimed in claim 12 wherein:

said driver stage is configured to amplify an input signal into an intermediate signal, and to pass said intermediate signal on to said output stage;

said output stage rectifies a portion of said intermediate signal to produce a dynamic bias offset, and passes said dynamic bias offset to said bias regulator; and

said bias regulator establishes said dynamic components of said driver-stage and output-stage bias currents in response to said dynamic bias offset.

14. A system as claimed in claim 12 wherein:

said system additionally comprises an envelope detector coupled to said driver stage and to said current-mirror circuit, and configured to produce an envelope current in response to an RF input signal; and

said current-mirror circuit is configured to produce both said quiescent and said dynamic components of said driver-stage and output-stage bias currents.

15. A system as claimed in claim 12 wherein:

said output stage comprises an output transistor fabricated upon a substrate;

said bias regulator comprises a reference transistor fabricated upon said substrate;

said output stage develops a bias offset in response to a thermal variation of said substrate; and

said bias regulator compensates said output-stage bias current for said bias offset.

16. A system as claimed in claim 12 wherein:

a portion of said output stage comprising an output transistor is fabricated upon a first substrate;

a portion of said bias regulator comprising a reference transistor is fabricated upon said first substrate; and

said current-mirror circuit is fabricated upon a second substrate.

17. A system as claimed in claim 16 wherein a portion of said driver stage comprising a driver transistor is fabricated upon said first substrate.

18. A system as claimed in claim 16 wherein

said first substrate supports components fabricated using a first integrated-circuit technology; and

said second substrate supports components fabricated using a second integrated-circuit technology different from said first integrated-circuit technology.

19. A method of adaptively controlling operation of an RF power amplifier, said method comprising:

selecting a radio operating mode;

producing, within a current-mirror circuit, a reference current in response to said selecting activity;

establishing, within a bias regulator, a bias current for an output stage of said power amplifier in response to said producing activity; and

determining a supply voltage for said power amplifier in response to said selecting activity.

20. A method as claimed in claim 19 additionally comprising establishing a bias current for a driver stage of said power amplifier in response to said producing activity

21. A method as claimed in claim 19 additionally comprising:

a) fabricating a portion of said power amplifier comprising an output transistor upon a first substrate;

b) fabricating a portion of said bias regulator comprising a reference transistor upon said first substrate; and

c) fabricating said current-mirror circuit upon a second substrate.

22. A method as claimed in claim 21 additionally comprising fabricating a portion of said power amplifier comprising a power transistor upon said first substrate.

23. A method as claimed in claim 21 wherein:

said fabricating activities a) and b) use a first integrated-circuit technology; and

said fabricating activity c) uses a second integrated-circuit technology different from said first integrated-circuit technology.

24. A method as claimed in claim 21 additionally comprising:

thermally coupling said reference transistor to said output transistor through said first substrate; and

compensating for thermal changes in said output transistor by effecting thermal changes in said reference transistor.

25. A method as claimed in claim 19 wherein:

said method additionally comprises detecting an envelope current in response to an RF input signal; and

said producing activity produces said reference current in response to said detecting activity.

26. A method as claimed in claim 19 wherein:

said method additionally comprises rectifying a portion of an RF signal to produce a bias offset; and

said establishing activity establishes said bias current in response to said producing and rectifying activities.